



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/618,650	07/15/2003	Hiroshi Kondoh	240266US2	5255
22850	7590	09/21/2005	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			TRAN, LONG K	
			ART UNIT	PAPER NUMBER
			2818	
DATE MAILED: 09/21/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/618,650

Applicant(s)

KONDOH, HIROSHI

Examiner

Long K. Tran

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Amdt on August 12, 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18, 20- 45 is/are pending in the application.
- 4a) Of the above claim(s) 8-17, 27 and 28 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 3, 29, 30 and 33 - 45 is/are allowed.
- 6) ☒ Claim(s) 1, 2, 5-7, 18- 26, 31-32 is/are rejected.
- 7) ☒ Claim(s) 4 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>8/12/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. This office action is in response to Amendment filed on August 12, 2005:
2. Claim **19** has been cancelled.
3. Claims **1, 3, 4, 29** and **30** have been amended.
4. Claims **8 – 17** and **27 – 28** have been withdrawn.
5. Claims **33 – 45** have been added.

Election/Restrictions

6. Claims **8 – 17** and **27 – 28** withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected species, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on April 18, 2005.
7. This application contains claims **8 – 17** and **27 – 28** drawn to an invention nonelected with traverse on reply filed on April 18, 2005. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

Note that in the telephone interview with Mr. Nikolaus Schibli on September 13, 2005, applicant indicates that claims **8 – 17** and **27 – 28** are cancelled when the application is allowable.

8. Claims **1 – 17, 18, 20 – 26** and **29 – 45** are presented for examination.

Information Disclosure Statement

9. This office acknowledges of the following items from the Applicant:

Information Disclosure Statement (IDS) filed on August 12, 2005.

The references cited on the PTO -1449 form have been considered.

Drawings

10. The drawings (fig. 20 and 21C) were received on August 12, 2005. These drawings are acceptable.

11. The drawings are objected to under 37 CFR 1.83(a) because they fail to show a second resistance layer positioned between the first resistance layer and the organic semiconductor as described in the specification (page 52, line 25 and page 53, line1) and in claim 4. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the

Art Unit: 2818

remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

12. The replacement of paragraph beginning at page 37, line 7 received on August 12, 2005 is acceptable.

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

14. Claims **1, 5, 6** and **7** are rejected under 35 U.S.C. 102(b) as being anticipated by Tanaka et al. (US Patent no. 5,892,244).
15. Regarding claim **1**, Tanaka discloses a semiconductor device, comprising: a gate electrode 2 (fig. 3);
an insulating layer 3 (fig. 3) on the gate electrode; a first electrode 5 (fig. 3) on the insulating layer; a second electrode 6 (fig. 3) on the insulating layer at an interval with the first electrode;

an organic semiconductor layer 4 (fig. 3) disposed in the interval between the first electrode and the second electrode and covering at least part of the first electrode and the second electrode; and

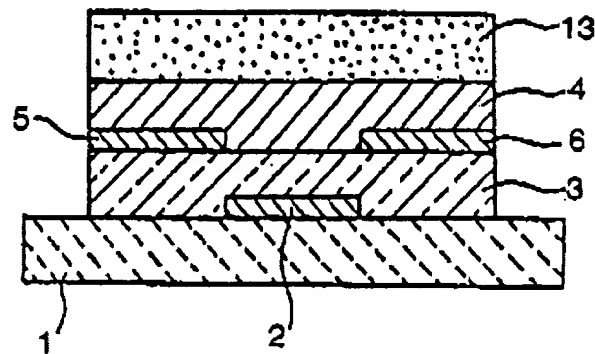
a first resistance layer 13 (fig. 3) made of poly (p-phenylene vinylene) formed on the organic semiconductor layer and having an electrical resistance lower than an electrical resistance of the organic semiconductor layer (column 12, lines 6 – 40; column 15, lines 66 – 67. *Note that Tanaka does not explicitly show the first resistance layer having electrical resistance lower than an electrical resistance of the organic semiconductor layer. However, since the resistance layer and the organic semiconductor layer made of material similar to that of the claimed invention, therefore the first resistance layer inherently having electrical resistance lower than an electrical resistance of the organic semiconductor layer as the instant claimed invention*).

Regarding claim 5, Tanaka discloses the first electrode, the second electrode and the first resistance layer is in contact with the organic semiconductor layer; and an interface between one of the first electrode, the second electrode and the first resistance layer rectifies an electrical current therethrough (col. 3, lines 27 – 37).

Regarding claim 6, Tanaka discloses the resistance layer is formed to be a plate shape (fig. 3).

Regarding claim 7, Tanaka discloses a substrate 1 (fig. 3) is beneath the gate electrode 2 (fig. 3).

FIG.3



16. Claims 1, 6, 7, 18, 21, 22 and 24 are rejected under 35 U.S.C. 102(b) as being anticipated by Tsumura et al. (US Patent no. 5,500,537).

17. Regarding claim 1, Tsumura discloses a semiconductor device, comprising: a gate electrode 2 (fig. 3);

an insulating layer 3 (fig. 3) on the gate electrode; a first electrode 4 (fig. 3) on the insulating layer; a second electrode 5 (fig. 3) on the insulating layer at an interval with the first electrode;

an organic semiconductor layer 7a (fig. 3; col. 6, lines 7 – 9) disposed in the interval between the first electrode and the second electrode and covering at least part of the first electrode and the second electrode; and

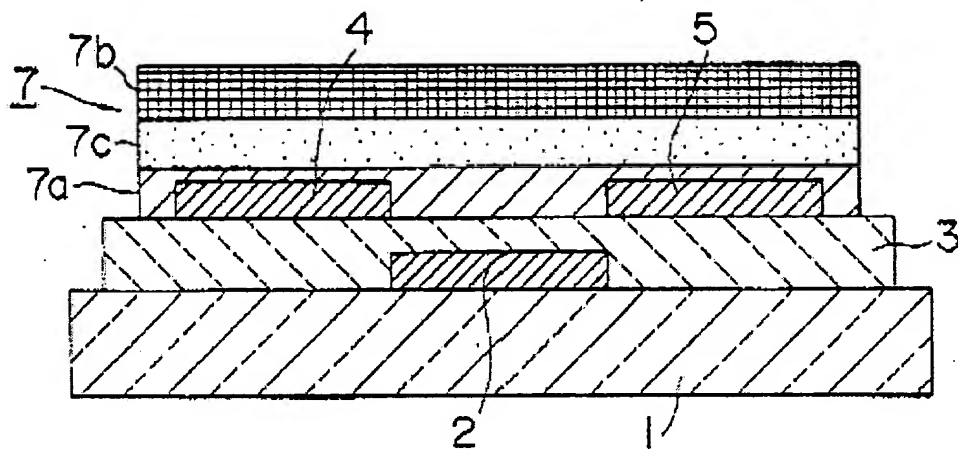
a first resistance layer 7b/7c (fig. 3; col. 6, lines 60– 67) formed on the organic semiconductor layer and having an electrical resistance lower than an electrical resistance of the organic semiconductor layer (col. 6, lines 18 – 21), wherein a first

Art Unit: 2818

resistance layer is formed of polymers such as polyethylene, polyesters, polyimide, polyphenylenesulfide, poly-para-xylene, and polyacrylonitrile (column 7, lines 1 – 15).

layer having electrical resistance lower than an electrical resistance of the organic semiconductor layer

FIG. 3



Regarding claim 6, Tsumura discloses the resistance layer is formed to be a plate shape (figs. 2 & 3).

Regarding claim 7, Tsumura discloses a substrate 1 (figs. 1 – 3) is beneath the gate electrode 2 (figs. 1 – 3).

Regarding claim 18, Tsumura discloses the organic semiconductor layer is formed from polythiophene, poly (3-substituted thiophene, poly (3,4-bisubstituted thiophene, polybenzothiophene (col. 4, line 29 – 46).

Regarding claim 21, Tsumura discloses each of the first electrode, the second electrode, and the gate electrode is formed from at least one of chromium (Cr), copper

Art Unit: 2818

(Cu), aluminum (Al), molybdenum (Mo), gold (Au), palladium (Pd), platinum (Pt), silver (Ag) (col. 3, lines 22 – 33).

Regarding claim **22** Tsumura discloses the insulating layer is formed from at least one resin selected from the group consisting of organic thin film: polyimide, silicon dioxide, silicon nitride, or a metal oxide produced via oxidation of a surface of an electrode layer formed from the metal (aluminum oxide) (col. 3, lines 51 – 62).

Regarding claim **24**, Tsumura discloses the second resistance layer is formed polyester or polyimide (col. 6, line 67 and col. 7, lines 1 – 10).

Claim Rejections - 35 USC § 103

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

19. Claims **2, 20, 23** and **25** are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al. (US Patent no. 5,892,244) or Tsumura et al. (US Patent no. 5,500,537).

Regarding claim **2**, figure 3 (of both Tanaka and Tsumura) illustrates both a distance from the first electrode to the first resistance layer and a distance from the second electrode to the first resistance layer appear to be shorter than the interval between the first electrode and the second electrode. Kim does not explicitly shows the values of the distances between the electrodes to the first resistance layer and the

Art Unit: 2818

interval between the electrodes. However, it would have been well known in the art that the selection of those parameters such as **energy, concentration, temperature, time, molar fraction, depth, width, thickness, etc.**, would have been obvious and involve routine optimization which has been held to be within the level of ordinary skill in the art. "Normally, it is to be expected that a change in **energy, concentration, temperature, time, molar fraction, depth, width, thickness, etc.**, or in combination of the parameters would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art ... such ranges are termed "critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation."

Moreover, the distances between the electrodes to the first resistance layer and the interval between the electrodes has not been alleged by applicant to be of significant importance for patentability.

Regarding claim **20**, Tanaka or Tsumura discloses the claimed invention of claim 1 except for the first resistance layer comprises at least one dopant with a low vapor pressure including one or more of poly(sulfonic acid), poly(styrenesulfonic acid), naphthalenesulfonic acid, and alkynaphthalenesulfonic acid. However this limitation is taken to be a product by process limitation, it is the patentability product and not of recited process steps which must be established. Therefore, when the prior art

Art Unit: 2818

discloses a product which reasonably appears to be identical with or only slightly different than the product claimed in a product-by process claim, a rejection based on sections 102 or 103 is fair. A product by process claim directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See *In re Fessman*, 180 USPQ 324,326(CCPA 1974); *In re Marosi et al.*, 218 USPQ 289,292 (Fed. Cir. 1983); and particularly *In re Thorpe*, 227 USPQ 964,966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product "gleaned" from the process steps, which must be determined in a "product by process" claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claim in "product by process" claim or not.

Regarding claim 23, Tanaka or Tsumura discloses the claimed invention of claim 1 except for the insulating layer is formed from at least a metal oxide film produced by coating and baking a solution obtained via hydrolysis of a metal alkoxide represented by one of the general formulas $M(OR)_{\text{sub}.n}$ and $MR(OR')_{\text{sub}.n-1}$, wherein each of R and R' is an organic group such as an alkyl group and a phenyl group, M is a metal in one of IVA through VIIA groups, VIII group, and IB through VIB groups of the periodic table, and n is an ionic valence of the metal M. However this limitation is taken to be a product by process limitation, it is the patentability product and not of recited process steps which must be established. Therefore, when the prior art discloses a product which reasonably appears to be identical with or only slightly different than the product claimed in a product-by process claim, a rejection based on sections 102 or 103 is fair.

Art Unit: 2818

A product by process claim directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See *In re Fessman*, 180 USPQ 324,326(CCPA 1974); *In re Marosi et al.*, 218 USPQ 289,292 (Fed. Cir. 1983); and particularly *In re Thorpe*, 227 USPQ 964,966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product "gleaned" from the process steps, which must be determined in a "product by process " claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claim in "product by process" claim or not.

Regarding claim **25**, Tsumura discloses the claimed invention of claims 1 and 4 except for the second resistance layer is formed from at least a metal oxide film produced by coating and baking a solution obtained via hydrolysis of a metal alkoxide represented by one of the general formulas $M(OR)_{\text{sub}.n}$ and $MR(OR')_{\text{sub}.n-1}$, wherein each of R and R' is an organic group such as an alkyl group and a phenyl group, M is a metal in one of IVA through VIIA groups, VIII group, and IB through VIB groups of the periodic table, and n is an ionic valence of the metal M. However this limitation is taken to be a product by process limitation, it is the patentability product and not of recited process steps which must be established. Therefore, when the prior art discloses a product which reasonably appears to be identical with or only slightly different than the product claimed in a product-by process claim, a rejection based on sections 102 or 103 is fair. A product by process claim directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See *In re*

Fessman, 180 USPQ 324,326(CCPA 1974); In re Marosi et al., 218 USPQ 289,292 (Fed. Cir. 1983); and particularly In re Thorpe, 227 USPQ 964,966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product "gleaned" from the process steps, which must be determined in a "product by process" claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claim in "product by process" claim or not.

20. Claim **26** is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al. (US Patent no. 5,892,244) or Tsumura et al. (US Patent no. 5,500,537) in view of Yang et al. (US Patent Application Publication no. 2002/013555).

21. Regarding claim **26**, Tanaka or Tsumura discloses the claimed invention of claim 1 except for a first power supply conducting a current between the first electrode and the second electrode; and a second power supply applying a voltage to the gate electrode.

However, it is conventional and also taught by Yang that transistor having a power supply to the gate of M7 (fig. 4) and a power supply connected to source (first electrode) and drain (second electrode).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a first power supply conducting a current between the first electrode and the second electrode; and a second power supply applying a voltage to the gate electrode in order to be able to program the device.

Art Unit: 2818

22. Claims **31** and **32** are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al. (US Patent no. 5,892,244) or Tsumura et al. (US Patent no. 5,500,537) in view of Ong et al. (US Patent Application Publication no. 2003/0164495).

23. Regarding claims **31** and **32**, Tsumura discloses the claimed invention of claim 1 except for the organic semiconductor layer includes a dielectric material selected from styrene-based polymers such as copoly(styrene/butadiene), copoly(styrene/acrylonitrile), terpoly(styrene/acrylonitrile/butadiene), copoly(styrene/maleic acid), and copoly(styrene/acrylic acid), polyethylene-based resins such as copoly(ethylene/vinyl acetate), and chlorinated polyethylenes, polypropylene, vinyl chloride-based resins such as copoly(vinyl chloride/vinyl acetate), polyester alkyd resins, polyamides, polyurethanes, polycarbonates, polyallylates, polysulfones, diallyl phthalate resin, poly(vinylbutyral) resin, polyether resins, polyester resins, acrylic resin, silicone resin, epoxy resins, phenolic resin, urea resin, melamine resin, fluorocarbon resins such as PFA, PTFE, and PVDF, Parylene resin, polyimide resins, and photo-setting resins such as epoxyacrylates and urethane acrylates, a metal oxide film produced by baking a solution obtained via hydrolysis of a metal alkoxide represented by one of the general formulas $M(OR)_{\text{sub}.n}$ and $MR(OR')_{\text{sub}.n-1}$, in which each of R and R' is an organic group such as an alkyl group and a phenyl group, M is a metal in one of IVA through VIIA groups, VIII group, and IB through VIB groups of the periodic table, and n is an ionic valence of the metal M, an oxide of one of Al, Ta, and W, Si, and a nitride of Si.

However, Ong shows a gate dielectric layer (same as the organic layer 7a (figs. 2 and 3 of Tsumura)) "is comprised of silicon nitride, silicon oxide, insulating polymers of a polyester, a polycarbonate, a polyacrylate, a poly(methacrylate), a poly(vinyl phenol), a polystyrene, a polyimide, an epoxy resin, an inorganic-organic composite material of nanosized metal oxide particles dispersed in a polymer, a polyimide, or an epoxy resin" ([0015], page 3, mid-left column).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use materials for forming a gate dielectric layer shown by Ong to replace the organic layer in Tsumura's device, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use.

Allowable Subject Matter

24. Claims **3, 29, 30** and **33 – 45** are allowed.

6. The following is an examiner's statement of reasons for allowance: Claims **3, 29, 30** and **33 – 45** are allowable over the prior art of record because none of the prior art whether taken singularly or in combination, especially when these limitations are considered within the specific combination claimed, to teach:

a first resistance layer 6 (fig. 6) being contacted with one of the first electrode 3 (fig. 6) and the second electrode as cited in the independent claims 3, 29 and 30; and among other limitations as cited in the independent claims 3, 29 and 30.

25. Claim 4 is objected to as being dependent upon a rejected base claim; but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

26. The following is an examiner's statement of reasons for the indication of allowable subject matter: Claim 4 is allowable over the prior art of record because none of the prior art whether taken singularly or in combination, especially when these limitations are considered within the specific combination claimed, to teach:

A second resistance layer formed at least one of the position between the first resistance layer and the organic layer (not shown; see drawing objection above), the position between the first electrode 3 (figs. 8 & 9) and the organic semiconductor layer 5 (fig. 9); and position between second electrode 4 (fig. 10) and the organic semiconductor layer 5 (fig. 10).

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Argument

27. Applicant's arguments with respect to claims 19 and 5 have been considered but are moot in view of the new ground(s) of rejection.

28. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

Art Unit: 2818

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

29. A shortened statutory period for response to this final action is set to expire THREE MONTHS from the date of this action. In the event a first response is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event will the statutory period for response expire later than SIX MONTHS from the date of this final action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Long K. Tran whose telephone number is 571-272-1797. The examiner can normally be reached on Mon-Thu.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on 571-272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2818

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Long Tran



September 12, 2005



David Nelms
Supervisory Patent Examiner
Technology Center 2800